REMARKS

Further and favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Status of Claims

Claims 1, 4-11, 14 and 17-19 are pending. Claim 14 is withdrawn.

The Examiner indicates that claims 2 and 12-16 are withdrawn from consideration. (Please see item 4a on the Office Action Summary page.) However, claims 2, 12, 13, 15 and 16 are cancelled.

Claim Amendments

Claims 1, 11 and 17 have been amended to recite, "wherein the vacuum member is made of one kind or two or more kinds selected from the group consisting of niobium, titanium, stainless steel, copper, aluminum and iron." As a result of this amendment, claim 3 has been cancelled, without prejudice or disclaimer.

Support for this amendment can be found in claim 3 (now cancelled), as well as page 9, lines 20-23 and page 14, lines 6-13 of the specification.

Accordingly, no new matter has been added to the application by these amendments.

Consideration After Final Rejection

Although this Amendment is presented after final rejection, the Examiner is respectfully requested to enter the amendments and consider the remarks, as they place the application in condition for allowance.

Patentability Arguments

The patentability of the present invention over the disclosures of the references relied upon by the Examiner in rejecting the claims will be apparent upon consideration of the following remarks.

Rejections Under 35 U.S.C. § 103(a)

The rejection of claims 1, 3-11 and 17-19 under 35 U.S.C. § 103(a) as being unpatentable over Higuchi et al., in view of Noguchi et al., Yoneda and Miller;

as well as the rejection of claim 19 under 35 U.S.C. § 103(a) as being unpatentable over Higuchi et al. in view of Noguchi et al., Yoneda, Miller and Tsuchiya et al.

are respectfully traversed.

The Position of the Examiner

The Examiner takes the position that Higuchi and Noguchi disclose the known process of surface treating an inner surface of a vacuum member by first mechanically polishing the vacuum member with a liquid medium containing hydrogen atoms, then subjecting the vacuum member to a chemical or electrochemical polishing process. The Examiner states that Higuchi and Noguchi also disclose the use of an oxidizing material formed as water which could be added to the liquid medium. However, the Examiner admits that Higuchi and Noguchi fail to teach or suggest a liquid medium absent of any hydrogen atoms where the liquid medium is a saturated hydrocarbon in a molecule of which the hydrogen atom or atoms are all substituted with a fluorine atom or atoms.

The Examiner asserts that Yoneda teach providing a solution intermingled with a polishing medium, where the non-aqueous solution is formed from various types of fluorocarbons. The Examiner states that since perfluorocarbons are examples of fluorocarbons which have had their hydrogen atoms replaced by fluorine atoms, this reference meets this limitation. Further, the Examiner states that Miller teaches that perfluorocarbons can be formed from saturated or unsaturated hydrocarbons.

The Examiner takes the position that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the liquid medium used in the process of Higuchi and Noguchi with a liquid medium formed as a saturated hydrocarbon under ordinary pressure and ordinary temperature where they hydrogen atoms are replaced with fluorine atoms, as taught by Yoneda and Miller.

The Examiner relies on Tsuchiya only to assert that it is old and known in the art to provide an oxidizing agent with nitric acid.

Applicants' Arguments

Applicants respectfully disagree with the Examiner's positions for the following reasons.

Applicants' invention exhibits unexpected and surprising effects compared to Higuchi, which is the closest prior art. Specifically, Applicants' invention unexpectedly suppresses the occlusion of hydrogen as a solid solution into an inner surface of the vacuum member, not only during mechanical polishing, but also during electrolytic polishing following the mechanical polishing. Due to the suppression of hydrogen occlusion, a superconducting accelerating cavity having a high performance can be made successfully, thus rendering unnecessary vacuum annealing after the polishing. Please see page 6, lines 15-22 of Applicants' specification.

The unexpected and surprising effects of Applicants' invention are achieved by adopting a liquid medium including a saturated hydrocarbon in a molecule of which a hydrogen atom or hydrogen atoms are all substituted with a fluorine atom or fluorine atoms when the vacuum member is formed and polished. These results would not have been expected by those of ordinary skill in the art at the time of Applicants' invention.

As evidence for the above, Applicants direct the Examiner's attention to Test Examples 1 and 2 and Example 1 of Applicants' specification, as well as the Rule 1.132 Declaration, which were previously submitted on September 24, 2007. In Experiment 3 of this previously submitted Declaration, the Comparative Experiment using water as a liquid medium corresponds to the invention of Higuchi, which is the closest prior art.

Applicants have repeatedly presented arguments that the claimed invention results in superior and unexpected results when compared to the closest prior art. The following passage was previously asserted in item (4) on page 8 of the Amendment filed August 19, 2008:

> Applicants' claimed invention has an effect of preventing the occlusion of hydrogen as a solid solution into a vacuum member during mechanical polishing, chemical polishing or electrochemical polishing, by using a liquid medium including a saturated hydrocarbon in a molecule of which a hydrogen atom or hydrogen atoms are all substituted with a fluorine atom or fluorine atoms when the vacuum member is formed and polished. This effect of Applicants' claimed invention is superior, as clearly shown in Test Examples 1 and 2 and Example 1 of Applicants' specification, as

well as the Rule 1.132 Declaration which was previously submitted to the USPTO on September 24, 2007. The Examiner is respectfully requested to review the discussion set forth on pages 10-13 of the Amendment After Final Rejection, filed September 24, 2007.

As the Examiner is certainly aware, a showing of unexpected and superior results is sufficient evidence of non-obviousness. (Please see MPEP 716.02(a)). Thus, it is asserted that Applicants' showing of superior results overcomes any asserted case of obviousness.

The superior effect of Applicants' claimed invention is neither disclosed nor suggested in Higuchi et al., Noguchi et al., Yoneda, Miller, nor the combination thereof. Applicants direct the Examiner's attention to page 10, lines 6-12 of the response filed September 24, 2007, which details the effects of Higuchi et al. and Noguchi et al. Additionally, the effect of Yoneda is to prevent a ceramic chip from being adversely influenced by water, i.e. partial elution of ceramic into water, at the time when a burned ceramic chip which contains alkaline earth metals such as Ba, Sr, Ca and the like is polished by using a non-aqueous liquid. (Please see the enclosed abstract of Yoneda.) The effect of Miller is to conveniently and effectively synthesize a number of useful fluoro perhalocarbons containing a four carbon atom membered ring. (Please see column 8, lines 29-31 of Miller.)

Thus, none of the cited references teach or suggest the superior results achieved by Applicants' claimed invention. According to MPEP 716.02(a), a showing of superior results is sufficient to rebut a case of obviousness.

In response to these arguments, the Examiner merely states that while Applicants provide a statement of unexpected results, the combination of references would also create this effect. However, Applicants respectfully assert that the Examiner's position is untenable, as this reasoning would nullify any showing of unexpected results in any situation involving a combination of references, where the unexpected results are shown by a comparison with the prior art. Specifically, the Examiner appears to take the position that since the asserted combination of references teaches the limitations of Applicants' claimed method, then the combination of references would achieve Applicants' unexpected results. However, this position is based on an inappropriate comparison of Applicants' invention to itself, i.e., the combination of references.

As clearly explained in the MPEP, when demonstrating unexpected results, the appropriate comparison is that of Applicants' invention with the closest prior art, i.e. a single reference. MPEP 716.02(e) states, "An affidavit or declaration under 37 CFR 1.132 must compare the claimed subject matter with the closest prior art to be effective to rebut a *prima facie* case of obviousness. *In re Burckel*, 592 F.2d 1175, 201 USPQ 67 (CCPA 1979)." (Emphasis added.)

Further, section III of this portion of the MPEP states, "Although evidence of unexpected results must compare the claimed invention with the closest prior art, applicant is not required to compare the claimed invention with subject matter that does not exist in the prior art. *In re Geiger*, 815 F.2d 686, 689, 2 USPQ2d 1276, 1279 (Fed. Cir. 1987) . . . ; *In re Chapman*, 357 F.2d 418, 148 USPQ 711 (CCPA 1966) (Requiring applicant to compare claimed invention with polymer suggested by the combination of references relied upon in the rejection of the claimed invention under 35 U.S.C. 103 'would be requiring comparison of the results of the invention with the results of the invention.' 357 F.2d at 422, 148 USPQ at 714.)." Thus, the Examiner is respectfully requested to consider Applicants' showing of unexpected results, as compared to the teachings of the closest prior art, i.e., Higuchi.

Contrary to the Examiner's position, the question to consider is not whether the combination of references could or would achieve the (unexpected) results of Applicants' invention. Rather, the question is whether Applicants' invention has unexpected results when compared to the closest prior art.

In this case, the Examiner has dismissed Applicants' showings of unexpected results. Additionally, the Examiner's rebuttal argument is based on the idea that Applicants' invention must be compared to itself. Further, The Examiner has failed to assert, or provided any evidence, that the cited combinations of references would be expected to achieve the results discovered by Applicants', i.e., preventing the occlusion of hydrogen as a solid solution into a vacuum member during mechanical polishing, chemical polishing or electrochemical polishing.

Accordingly, for the reasons set forth above, as well as those in the previously submitted remarks, the unexpected and superior effect of Applicants' invention is neither taught nor

suggested in Higuchi, Noguchi, Yoneda, Miller and Tsuchiya, nor the cited combinations thereof. Thus, for this reason alone, the above-rejections are untenable and should be withdrawn.

Additionally, Yoneda describes a manufacturing method of a ceramic electronic part, comprising the step of polishing a ceramic chip. (Please see paragraph [0006], lines 1-6 of Yoneda.) However, as discussed above, Applicants' independent claims require polishing a vacuum member made of one kind or two or more kinds selected from the group consisting of niobium, titanium, stainless steel, copper, aluminum and iron. Yoneda fails to teach or suggest this limitation.

Furthermore, the Examiner relies heavily upon the Miller reference, and asserts that the particular problem of Miller using a fluorocarbon compound is similar to the problem to be solved by the present invention. However, Applicants respectfully assert that this position is untenable.

Miller discloses in column 2, lines 22-28 that "Another object of this invention is to devise a convenient and effective synthesis for the dimers and trimers of fluoroperhalogenated conjugated diolefins, the perfluorocarbons and perfluorochlorocarbons especially after further treatment to saturate the unsaturated bonds present with fluorine or chlorine, being useful as lubricants where reactive substances are present." (Emphasis added.)

Lubricants prevent or decrease friction. In support of this, please see the page from Hawley's Condensed Chemical Dictionary, attached hereto. The chemical dictionary defines lubricant as "a material having characteristic crystalline habit that causes it to shear into thin, flat plates, which readily slide over one another and thus produce an antifriction or lubricating effect. . ."

On the contrary, the mechanically polishing step recited in Applicants' claims needs or makes use of friction. Thus, the Miller reference teaches away from Applicants' claimed method, and certainly cannot be relied upon as motivation to use the compound of Miller as a liquid medium in mechanical polishing.

Regarding claim 19, the Examiner relies upon Tsuchiya as teaching an oxidizing agent

with nitric acid. However, Applicants respectfully assert that this indication by the Examiner is untenable.

Nitric acid is usually used in chemical polishing, as described on page 4, lines 11-12 of Applicants' specification. Tsuchiya only discloses that nitric acid is usually used in chemical mechanical polishing. However, step (b) of the process set forth in Applicants' claim 17 (upon which claim 19 depends) is electrochemically polishing. Chemical mechanical polishing is different from electrochemically polishing, as described on page 3, lines 13-18 and 25-26 of Applicants' specification.

Therefore, Tsuchiya neither teaches nor suggests any component of step (b), regarding electrochemically polishing. Thus, Applicants' claim 19 is unobvious from the combination of Higuchi, Noguchi, Yoneda, Miller and Tsuchiya.

In addition to the detailed discussion set forth above, the Examiner is also respectfully requested to review the arguments presented on pages 6-8 of the Amendment filed August 19, 2008.

For the foregoing reasons, Applicants respectfully assert that the subject matter recited in the pending claims is unobvious over the cited combinations of references, and the rejection should accordingly be withdrawn.

Conclusion

Therefore, in view of the foregoing amendments and remarks, it is submitted that the ground of rejection set forth by the Examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

If, after reviewing this Amendment, the Examiner feels there are any issues remaining which must be resolved before the application can be passed to issue, the Examiner is respectfully requested to contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

Kenji SAITO et al.

/Amy E. Schmid/
By: 2009.03.10 16:56:42 -04'00'

Amy E. Schmid
Registration No. 55,965
Attorney for Applicants

AES/emj
Washington, D.C. 20006-1021
Telephone (202) 721-8200
Facsimile (202) 721-8250
March 10, 2009

Hawley's

Condensed Chemical

Dictionary

THIRTEENTH EDITION

Revised by

Richard J. Lewis, Sr.

VAN NOSTRAND REINHOLD

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low explosive. See explosive, low.

low-melting alloy. See alloy, fusible.

low-pressure resin. See contact resin.

low-soda alumina. Aluminum oxide (Al_2O_3) with <0.15% sodium oxide content.
Use: High-grade electric insulator and other ceramic bodies.

LOX. Abbreviation for liquid oxygen, especially when used as a rocket fuel.

LPG. Abbreviation for liquefied petroleum gas.

Lr. Symbol for element lawrencium.

LSD. Abbreviation for lysergic acid diethylamide.

"L-Selectride" *[Aldrich].* TM for lithium tri-*sec*-butylborohydride, 1.0 molar solution in tetrahydrofuran. $LiB[CH(CH_3)C_2H_5]_3H$.
Properties: Liquid. Mw 190.11, d 0.890, freezing p −17C. Moisture sensitive. Packaged under nitrogen.
Hazard: Pyrophoric, must be handled under inert atmosphere.
Use: Reagent for the stereoselective reduction of ketones. Has been used in prostaglandin synthesis.

LTH. Abbreviation for luteotropic hormone. See luteotropin.

Lu. Symbol for lutetium.

lube-oil additive. A chemical added in small amounts to lubricating oils to impart special qualities, such as low pour point when chlorinated hydrocarbons are added. Other special properties include the following:

low viscosity index	butene polymers
detergent and suspensoid properties	metallic stearate soaps
oxidation stability	calcium stearate
reduced foaming tendency	silicone compounds
resistance to high operating temperatures	phosphorus pentasulfide, zinc dithiophosphate

lubricant, solid. A material having a characteristic crystalline habit that causes it to shear into thin, flat plates, which readily slide over one another and thus produce an antifriction or lubricating effect, for example, mica, graphite, molybdenum disulfide, talc, boron nitride.

lubricant, synthetic. Any of a number of organic fluids having specialized and effective properties that are required in cases where petroleum-derived lubricants are inadequate. Each type has at least one property not found in conventional lubricants. Though their cost is much higher, they can be used over a wide range of temperatures and are stable to heat and oxidation. The major types are polyglycols (hydraulic and brake fluids), phosphate esters (fire-resistant), dibasic acid esters (aircraft turbine engines), chlorofluorocarbons (aerospace), silicone oils and greases (electric motors, antifriction bearings), silicate esters (heat-transfer agents and hydraulic fluids), neopentyl polyol esters (turbine engines), and polyphenyl ethers (excellent heat and oxidation resistance, but poor performance at low temperatures). An unusual property of synthetic lubricants is their exceptional resistance to ionizing radiation.

lubricating grease. A mixture of a mineral oil or oils with one or more soaps. The most common soaps are those of sodium, calcium, barium, aluminum, lead, lithium, potassium, and zinc. Oils thickened with residuum, petrolatum, or wax may be called greases. Some form of graphite may be added. Greases range in consistency from thin liquids to solid blocks, and in color from transparent to black. The specifications for a grease are determined by the speed, load, temperature, environment, and metals in the desired application. Texture of grease may be smooth, buttery, ropy or stringy, fibrous, spongy, or rubbery. The texture does not necessarily indicate the viscosity of the grease, but is related to the formulation and methods of manufacture.
See lubricating oil.

lubricating oil. (lube oil). A selected fraction of refined mineral oil used for lubrication of moving surfaces, usually metallic and ranging from small precision machinery (watches) to the heaviest equipment. Lubricating oils usually have small amounts of additives to impart special properties such as viscosity index and detergency. They range in consistency from thin liquids to greaselike substances. In contrast to lubricating greases, lube oils do not contain solid or fibrous materials.
See porpoise oil; lubricant, synthetic; extreme-pressure additive (2); lube oil additive.

lubrication. The introduction of a substance of low viscosity between two adjacent solid surfaces, one of which is in motion (bearing). From an engineering point of view, the chemical nature of the substance is not of critical importance. Thus, materials as diverse as air, water, and molasses could theoretically be used as lubricants under appropriate conditions. Air and water have been used, as well as some solids such as graphite, but in general oils, fats, and waxes are utilized. The ability of a substance to act as a lubricant is sometimes called lubricity.

lubricity. See lubrication.